From:	HOPE Bruce
To:	Nancy Judd; csmith@parametrix.com; Eric Blischke/R10/USEPA/US@EPA
Cc:	John Toll; Lisa Saban; Jim McKenna; Suzanne Replinger; Valerie Oster
Subject:	RE: Review of Bruce Hope dynamic FWM for LWR- correction
Date:	12/21/2006 09:47 AM

Nancy,

First, thanks for the careful QA of the model code - it takes more than one set of eyes to look at this stuff.

Second, I used uniform distributions simply to retain the range information that was available from your 2005 report - I didn't want to leave any hard-earned data on the table. Since many of these variables aren't the "sensitive" ones it doesn't matter that much anyway. I don't have (but you may have) the raw data with which to establish probability distributions, so I didn't.

Bruce

-----Original Message-----
From: Nancy Judd [mailto:nancyj@windwardenv.com]
Sent: Wednesday, December 20, 2006 2:33 PM
To: csmith@parametrix.com; HOPE Bruce; blischke.eric@epa.gov
Cc: John Toll; Lisa Saban; Jim McKenna; Suzanne Replinger; Valerie Oster
Subject: RE: Review of Bruce Hope dynamic FWM for LWR- correction

> Carrie, Eric, and Bruce,
> Regarding my last question (from my previous email- pasted below) about the use of uniform ranges for distributions, I was incorrect when I spoke of distributions for output. If I understand correctly, the outputs are single values (not distributions) but different parameter input values are randomly selected for each model iteration (we spoke of daily frequency at the Nov 29th meeting for model iterations). I still have concerns about the use of uniform distributions for some parameters. Again, if I understand it correctly, the way the model is set up now, every day the bass has a different weight randomly selected from a bounded range. Over time, the bass weight (on average) will be about the middle of the range (and the middle of the range for everything else with a uniform distribution- dietary components, etc.) In case of bass weight, the average weight for all LWR samples was 60% less than the mid-point of the uniform range (which bounds the max and min of the empirical data). What exactly are we are we trying to get out of including the uniform distributions? I can see some utility for the diets, but I'm not sure about some other parameters. Maybe you can clarify? I think this may be related to the issue of whether we are trying to model variability of individuals in the population vs uncertainty in our prediction of the population average. If the model produces only one prediction per day for each species group, I assume we are trying to model populations? Nancy
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From: Nancy Judd [mailto:nancyj@windwardenv.com]
Sent: Wednesday, December 20, 2006 1:26 PM
To: blischke.eric@epa.gov; HOPE Bruce; csmith@parametrix.com
Cc: Jim McKenna; Valerie Oster; Lisa Saban; John Toll; Suzanne Replinger; Carl Stivers
Subject: Review of Bruce Hope dynamic FWM for LWR

Eric, Bruce, and Carrie,
Windward has reviewed the new dynamic version of the Arnot and Gobas FWM provided to the LWG November 29, 2006. We have identified some discrepancies in the code between the steady state and dynamic versions of the model and have developed a list of questions related to the application and functionality of the model (see below). We hope these will be helpful in refinement and application of the linked Fate and Transport FWM. I am available the rest of this week and then out of town all of next week if you have questions or want to discuss these comments. Nancy

Summary of Changes made to VBA code for the Dynamic FWM

A *steady state* VBA version of the Arnot and Gobas model was provided by Bruce Hope to the LWG in early summer 2006. Windward made some corrections and updates to the model which were provided in emails to Bruce Hope in the summer of 2006. The following changes were made in the VBA code for the *dynamic* fate and transport model provided by Bruce Hope to Windward on November 29, 2006 (as compared to the steady state version of the model provided to Windward by Bruce Hope and updated by Windward). In addition to the differences listed below, some additional dietary fraction (DF) references were added to Windward's version of the steady state model (as was communicated to Bruce Hope in emails in the summer of 2006) that are not included in the dynamic version of the model. Depending on the selections for diets (who eats who) these may not be needed, but the flexibility of the dynamic model to accommodate different dietary constituent is currently limited. The following were identified as potential errors in the dynamic model code (but were correct in Windward's updated steady state version of the model except the correction for benthic invertebrate filter feeder as indicated below).

- ZOOPLANKTON (3):

  CB3 equation term “CB2prev” changed to CB2 as was used in other CB equations throughout code

- BENTHIC INVERTEBRATE FILTER FEEDER (4):

  Dietary portion of CB4 equation altered as shown below to include impact of SCV4 term. This error was also identified in the previous steady state model, but was not changed because it has no impact on results since SCV4 = 1.0 in model. Thus, exclusion of this term in the equation had no effect on results.

  Old dietary portion in both steady state and dynamic models: CB4 = *CPW * ED4 * Food4D * (GV4 * WB4)*

  Equation simplified to = *KD4 * Food4D*, since *KD4 = ED4 * GD4 / WB4* and *GD4 = GV4 * CPW * SCV4*

- SCULPIN – FORAGE (7):

  Added definition for DF71 (sculpin consumption of sediment)

  Incorporated DF71 into equations Food7A – Food7D

- CARP – OMNIVORE (9):

  Incorporated DF91 (carp consumption of sediment) into equations Food9A – Food9D

- CARP – OMNIVORE (9)

  Removed “WB9” (carp weight) term from CB9 equation

  Original equation: *CB9 = CB9prev + CWB * K19 * (1 - FPW9) + CSD * WB9 * K19 * FPW9 + KD9 * Food9D - CB9prev * (K29 + KE9 + KG9 + KM9)*

  Corrected equation: *CB9 = CB9prev + CWB * K19 * (1 - FPW9) + CSD * K19 * FPW9 + KD9 * Food9D - CB9prev * (K29 + KE9 + KG9 + KM9)*

- SMALLMOUTH BASS – SMALL PISCIVORE (10):

  Added definition for DF105 (bass consumption of BIC)

  Incorporated DF105 into equations Food10A – Food10D

Remaining questions concerning dynamic FWM

- Is it appropriate to average tissue concentrations across all segments at the end of the modeling process (rather than throughout on a daily basis) in order to calculate tissue concentrations for larger home range species? This may be in the noise of the precision of the model, but would likely lead to different results.
- Since 0.25 day segments are used in “TFout” tab, how is this rate of change (per ¼ day as opposed to per day) accounted for

in the model since many of the parameters are in rates of per date (e.g. growth rate per day)?

- All distributions included are uniform and the model is no longer run with Crystal Ball. Since uniform distributions assume the likelihoods of all possible values in the specified range are equal, the resulting range of output reflects limited information on the likelihood of different outputs. The inclusion of non-uniform distributions (using Crystal Ball) for parameters in the fate and transport application of the model may not warranted if this results in reduced speed or model functionality.
However, isn't the utility of output distributions derived from uniform input distributions (only) fairly limited since they are basically just a range without information on the most likely output value?

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